



# Incremental Train Control System (ITCS)

***GE Transportation Systems***  
*Global Signaling*

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## What is it?

### Full featured Positive Train Control

- High Speed Train Operation
- Obstacle detection and feedback
- Full Enforcement
- FRA Approved and Tested



## System CTQ's

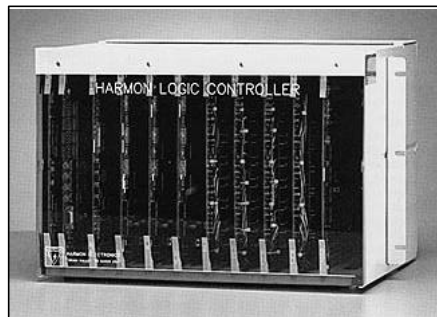
### Display and Enforce:

- Signal Speeds
- Fixed Speed Limits
- Temporary Speed Limits
- Work Area Restrictions

Advance Start of Crossings

Feedback Crossing Status to Train

Fully VITAL Solution



VHLC

Proven  
Technology



Ultra  
Cab II

**ITCS Extends Infrastructure for More Efficient Operation**

## What does ITCS really “give you”?



- **High Speed Operation**
  - **Wireless XING activation**
  - **Speed Enforcement**
- **Signal Upgrades**
- **Safety**
  - **Signal look-ahead**
  - **XING activation and verification**
  - **Obstacle detection**
- **Engineer confidence**

**Throughput, Safety and Confidence**



## What is high speed?



- **90 MPH - now**
  - **Since Jan 7, 2002**
- **100 MPH – 2004**
- **110 MPH – 2005**
- **Designed for 150 MPH**
- **Waiver extension recently requested**

**High Speed is achievable because of XINGs and Speed Enforcement**



## Operations Today in Michigan



- Revenue Service for nearly 3 years
- Every train operates ITCS in the corridor (Amtrak, NS)
- Wireless XING pre-start for each XING in territory

**Confidence Achieved**



## Territory Expansion Ongoing!



- 20 miles expanded to 45 miles March 19, 2001
- 45 miles to expand to 71 miles Q2, 2003
- Potential to expand to nearly 100 miles in 2003-04

**Larger Territory, Lower Trip Time**



## Enforcement is Active



- **Complete Brake Interface**
- **Full Service Braking Enforcement**
- **April 18, 2001**

**Braking is only a backup to the Engineer**





## Operations Today



- **Amtrak - 8 Trains in Daily Revenue Service @ 79 MPH**
- **90 MPH Service – Trip time is DOWN!**
- **Norfolk Southern Local (2 per week)**
- **Tested 5000+ Ton Freight Train with Predictive Stopping and Enforcement**

**Reliability, Teaching, Learning**





## ***GE Transportation Systems***

### ***Global Signaling***

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**Where do we go from here?**





## RF Communication Issues – Greatly Reduced, but still a nuisance



- **Spread Spectrum Radio Obsolescence**
- **ATCS Coverage Issues**
- **Network re-evaluation, improvements Q2 2003**

**Always enough time and money to make it “a little better”, never to FIX it**

## Safety Case Completion



- **Complete ITCS Safety Case – Kickoff Q1 2003**
- **Enable 100+ MPH operation**
- **System Operational up to 150 MPH**

**Proven Vital, Audited System for PTC**





## The potential is now being realized

- System has been installed and commissioned over the last 6 years
- Ready for interoperability / interaction with IDOT System



**ITCS - The key to high speed safety**